

MATH 595 MAG
MODERN ALGEBRAIC GEOMETRY II
SPRING 2022

Time: TuTh 11:00–12:15

Instructor: Sheldon Katz

Course website: <https://faculty.math.illinois.edu/~katz/class/s22/>

Text: Algebraic Geometry, R. Hartshorne, Graduate Texts in Mathematics 52, Springer NY 1977. An electronic copy of the text is linked from the course website.

Prerequisites: Modern Algebraic Geometry (Math 512), or permission of the instructor

The course focuses on Chapter III of the text, on derived functors, cohomology, and applications. For the most part we will follow the topics in the text, but not necessarily the treatment in the text. Our main examples will be cohomology of sheaves on topological spaces, cohomology of sheaves of \mathcal{O}_X -modules on a scheme X , Ext groups, Ext sheaves, and higher direct images of a morphism. As time allows, we will also cover derived categories and spectral sequences. Since the goal is for students to learn to *use* algebraic geometry, many examples will be worked out during class.

A lot of homework problems will be given, but they will neither be collected nor graded. You will have the opportunity to go over problems during bi-weekly problem sessions. Since this is an advanced graduate course, grades are a non-issue, but regular attendance is expected. However, if you want to truly master the material, you are encouraged to try to do all of the problems. That being said, I recognize that your time is limited, so the course is designed to be valuable to you regardless of how much homework you complete.

Weekly readings and homework assignments will be posted on the course website.